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AUTHOR Soto, Gloria; And Others
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ABSTRACT

This study investigated whether a person with profound mental retardation could effectively learn specific requests using two different communication modes, both including the same set of graphic symbols. It also sought to compare whether the participant showed a preference for one modality over the other and to determine whether the participant could functionally use different communication modes depending on the characteristics of the environment. The young adult subject used manual signs as his primary means of communication. The two communication devices studied included a portable picture board and a programmable voice output communication aid (VOCA) with an overlay containing the same graphic symbols as the board. Results indicated that the subject met criteria for both communication devices at two settings during intervention and kept the criteria during preference assessment and maintenance phases. The subject showed stronger preference for one modality over the other. Generalization measures indicate that the subject generalized the use of his preferred communication device (VOCA) to different settings and different communication partners and successfully requested items of his choice at a fast food restaurant. (28 references) (JDD)

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Teaching Specific Requests: A Comparative Analysis on Skill Acquisition and Preference using Two Augmentative and Alternative Communication (AAC) Modalities

Gloria Soto
Phillip J. Belfiore
Ralf W. Schlosser
Carl Haynes
Purdue University

Mailing Address: Gloria Soto Moratinos
Educational Studies; SCC-E
West Lafayette, IN 47907

Phone: (317) 494-7332
FAX: (317) 496-1228

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ABSTRACT

Multimodality should be an issue to consider when planning augmentative and alternative communication (AAC) intervention for persons with severe disabilities. The particular communication mode or combination of modes used by a nonspeaking individual depends on the demands and characteristics of the individual and the situation. The client preference should also be an important consideration in selecting the AAC system that better fits those variables.

The purpose of this study was threefold. Firstly, to determine whether a person with profound mental retardation could effectively learn specific requests using two different communication modes. Secondly, to compare whether the participant showed a preference for one modality over the other. Thirdly, this study attempted to determine whether the participant could functionally use different communication modes depending on the characteristics of the environment. A multiple baseline across settings with alternating treatments design was used to address the research questions. Results on skill acquisition, preference and generalization are further discussed.

Teaching Specific Requests: A Comparative Analysis on Skill Acquisition and Preference using Two Augmentative and Alternative Communication (AAC) Modalities

Communication skills have long been recognized as crucial to learning and effective functioning in society for students with cognitive impairments and mental retardation. As many individuals with severe cognitive impairments have little or no functional speech (Burd, Hammes, Bornhoeft, & Fisher, 1988; Matas, Mathy-Laikko, Beukelman, & Legresly, 1985), this population frequently require the provision of augmentative and alternative communication (AAC) systems.

Several surveys of speech and language pathologists as well as special educators suggest that the most prevalent AAC systems used among individuals with severe disabilities are unaided (e.g, manual signs, and gestures) rather than aided (e.g., graphic symbols) modalities (Fristoe & Lloyd, 1978; Beukelman & Legresley, 1985). The frequent use of manual signs with this population has been attributed to several variables: they require less sophisticated motor skills than speech (Vanderheiden & Lloyd, 1986); they are easily taught because some signs closely resemble the object and action they represent (e.g., Bellugi & Klima, 1976), they, although dynamic, can be held visually static providing a good model for imitations (e.g., Dennis, Reichle, Williams, &

Vogelsberg, 1972), and they are portable. In general, manual signs and gestures require processing of temporal and spatial information (Mirenda, 1985). Unlike unaided symbols, graphic symbols are static (Fuller, Schlosser, & Lloyd, 1992a) and may therefore be easier to process (Mirenda, 1985) and aid recognition memory.

A second viable route to AAC is the use of aided modalities such as the use of graphic symbols on manual communication boards or electronic voice output communication aids (VOCAs). Graphic symbols can be accessed using a variety of techniques, requiring a lesser degree of motor abilities (i.e., minimal motor requirements using scanning and single switch activation to direct selection) (Lloyd & Karlan, 1984). Graphic representations further allow for total iconicity (e.g., photographs) (Lloyd & Karlan, 1984). Although many more considerations seem important when selecting either an aided or unaided AAC system (see Fuller, Schlosser, & Lloyd, 1992), AAC is generally conceptualized as multimodal, involving either more than one aided modality, more than one unaided modality, or mixed modalities (Mustonen, Locke, Reichle, Solbrack, & Lindgren, 1991; Vanderheiden & Lloyd, 1986). Whenever possible, the client should be directly involved in selecting an AAC system. The lack of self-determined options may lead to behavior problems and increase the possibility of intervention failure (LaVigna, Willis, & Donnellan, 1989).

Several variables have been suggested to warrant the selection of certain modalities over others, including the communicative needs of the client, environmental demands (Jones, Jolleff, McConachie & Wisbeach, 1990; Hooper, Connell, & Flett, 1988), contextual characteristics (Jones et al., 1990) and partner competence (Bryen, Goldman, Quinslik-Gill, 1989; Bryen & McGinley, 1991; Hooper et al., 1988). For example, recent surveys indicate that immediate care staff and teaching personnel in community facilities of persons with developmental disabilities frequently lack sufficient signing competence (Bryen, et al., 1989; Bryen & McGinley, 1991).

To date, educators/clinicians are provided with very little guidance based on empirical investigations regarding the relative effectiveness and/or efficiency of various AAC modalities. Based on a comparative study of the effectiveness of several communication systems for ordering meals in fast food restaurants , Doss and associates (1991) suggested that the best mode to be used is a graphic communication wallet, since it is easily displayed, understood and socially accepted. They also argue that optimizing the voice output of an electronic device may be a way to increase the effectiveness in communicative interactions. In a single subject study involving two youth with autism, Rotholz, Berkowitz, and Burberry (1989) argued that the use of a communication book (and graphic symbols) is more effective in fast food restaurants in terms of successful requests than

manual signing. They explained this result with the lack of signing competence among communicative partners at fast food restaurants (e.g., cashiers). However, these conclusions are only suggestive as the procedures and the design employed seem flawed in several ways: Firstly, effectiveness is solely based on generalization data obtained in community probe sessions. Training data with a communication board are not reported and a pregeneralization baseline for communication board used in the fast food restaurants is not available. Thus the success of the generalization performance cannot be evaluated against either training performance or pregeneralization performance. The two participants may have generalized prior to training. Secondly, request training was not implemented with manual signing (only assessed during the baseline condition). Therefore, a comparison of effectiveness between the two modalities is based on unequal conditions (intervention vs baseline).

The purpose of this study was threefold. Firstly, to determine whether a person with profound mental retardation could effectively learn specific requests using two different communication modes (i.e. a portable communication board and a VOCA), both including the same set of graphic symbols. Secondly, to compare whether the participant showed a preference for one modality over the other. Thirdly, this study attempted to determine whether the participant could functionally use different communication modes depending on

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the characteristics of the environment (i.e., communication partners unfamiliar to signing).

METHOD

Participant Description

Sam is a 22 year old male, functioning in the severe to profound range of mental retardation (Grossman, 1983). Sam resides in a local group home, and attends a community-based vocational center daily where he participates in vocational training and leisure/recreational activities. Sam has also been diagnosed with seizure disorder and atopic dermatitis. Prior to fall 1988, he was institutionalized in a large state facility. Sam can vocalize 2-4 single words (e.g., "bye", "here", "hi", "no") and 1-2 word phrases, of which less than 1/2 were intelligible by others, staff included. Sam has a repertoire of approximately 50 manual signs. Some of the signs he uses expressively are: "want", "drink", "go", "eat", "work", "write", "brush", "sleep", "help", "bath", "shoes", "yes", "please", "sorry", and "thank you". At times he combines vocalizations with manual signs. Sam could comprehend simple instructions such as "bring me this", "it's time to work", and the procedural instructions used during the course of this study.

Sam also has a history of self injurious behavior (SIB). He exhibited various forms of SIB, including head-banging, throwing himself on the floor, and hitting and scratching his hands and arms.

Setting and Materials

All experimental sessions were conducted in a one-to-one instructional format in the participant's vocational site and at the group home. In both settings, the experimenter carried the necessary supplies to an adjoining room in order to limit distraction. The generalization probes were conducted at a local fast food restaurant.

For all experimental sessions, two different sets of material were required: (a) one for the leisure drawing activity (e.g., paper and crayons), and (b) one for the snack activity (e.g., pop-corn and a glass of a soft drink). Both activities were selected on the basis of the client's observed preferences, staff feedback on preferences, and because both activities were functional and age appropriate leisure activities. For the generalization probes only the communication devices and the data recording material were necessary.

Sigsymbols (Cregan, 1984; Cregan & Lloyd, 1990) were utilized for this study. Sigsymbols are easily drawn symbols, that provide a stable visual cue for manual sign users to reinforce language learning and support expression. Sigsymbols depict graphically dynamic manual signs, and introduce the subject to graphic communication. Because the symbol is paired with the printed word the system is suitable to interact with persons who do comprehend use manual sign.

Sigsymbols were selected because the participant used manual signs as his primary means of communication. Pictorial

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graphics depicting objects have iconic resemblance to the referent and provide the opportunity of being taught along with the concrete object or photograph of the referent. Sign-linked graphic symbols depicting a manual sign can be taught in conjunction with the motor experience of signing.

Nine Sigsymbols were selected for the activities in this study: (1) I want, (2) paper, (3) crayons, (4) a drink, (5) pop-corn, (6) a break, (7) ice-cream, (8) hamburger, and (9) french-fries.

Two communication devices prepared for this experiment (a) an easily portable picture board and (b) a programmable VOCA (Wolf™) with an overlay containing the same graphic symbols as the board.

Dependent Variable and Data Collection

The dependent measure was the frequency of correct specific request (i.e., "I want" plus the name of the specific item) used by the subject without corrective assistance of any kind. Data collection was conducted by checking the appropriate option from a data collection sheet. The collection sheet included all the possible options (correct response: specific request "I want + item" using the target modality; incorrect response: request via single pointing, or use of other communicative modalities; and no response) for all possible vocabulary items. These entries were then scored to calculate the percentage of correct response by dividing the number of correct trials by the total number of trials. For reliability purposes, data were

collected simultaneously by other experimenters and/or staff members at each experimental setting for approximately 30 % of the sessions. Interscorer agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements with a result of 90% for the mean interscorer agreement score.

Experimental Design

A multiple baseline design across settings with alternating treatments was used to address the research questions (Barlow & Hayes, 1979; Barlow & Hersen, 1982). Correct responses were modelled and reinforced only during Intervention sessions. Therefore, the design allowed for the comparison of the percentage of correct responses during baseline, during intervention, and after the conditions of the intervention were withdrawn during both preference and maintenance phases. The design also allowed for the comparison of 2 topographically dissimilar communication modalities as taught in an alternating manner.

Procedures

For this study, each session consisted of two conditions, one with the picture board, and one with the VOCA. A maximum of 12 trials were provided per condition, 24 total trials per session. Two sessions (one at each setting) were conducted per day. Maintenance probes were collected at one-week, two-week, and four-week intervals following the completion of the preference assessment.

Two activities were selected to occasion Sam's communicative use of the two devices: (a) the picture board and (b) the VOCA. The first leisure activity was "drawing". The second leisure activity was "snack time". Each session at either the group home or work, was structured so that drawing ocurred first, a break for snack followed, and a continuation of drawing ended the session. This activity sequence seemed to reflect a natural sequence of routine events.

Baseline. The percentage of correct requests was observed and reported in both experimental settings: group home, and the community-based vocational center. Each session consisted of two conditions (picture board or VOCA). The conditions were randomized in order to avoid order effects (Barlow & Hersen, 1982). Sam was not instructed in the use of either device nor was he prompted to use them during baseline. The sessions were run within the subject's daily routine. Each session started with the drawing activity, followed by a break for snack and completed with a continuation of drawing. Before drawing, the experimenter would ask Sam whether he wanted to work for a while. If agreed, Sam would be prompted to request the necessary or desired item to complete the activity. For instance, the experimenter would say: "Sam we are going to draw for some time. What do you need to draw?" Sam's correct response was the specific request ("I want" plus "paper" or "crayons") using the target device which was in the center of the work desk. The experimenter would then provide Sam with the

requested item. When Sam used manual signs, or pointed to the desired item without using "I want", the objects he requested would still be provided as a natural contingent response to an appropriate communication act, but the response would be scored as incorrect for that particular trial. If Sam had not responded to the first cue after 5 seconds, the experimenter would repeat the cue a second time. If Sam had still not responded, the experimenter would score that trial as no-response. Each new trial that followed was introduced with the prompt "What else do you need?" as an attempt to gather all necessary materials for the activity.

Following drawing, the trainer would suggest time for a snack: "you have done a good job, Sam. It's time for a break. What do you want for snack?" Since the established snack routine included pop-corn and soda, those items were included as trials in the activity-based vocabulary.

After snack, Sam was asked if he wanted to draw again. If Sam indicated yes, the drawing routine would be again initiated with the same cue "Sam, What do you need to draw?". No condition surpassed the total of 12 trials.

When all 12 trials were completed, or Sam had indicated a desire to stop, the experimenter would remove the target communication device and would place the other on the table. Sam would then be asked if he still wanted to work a bit more. Generally, Sam enjoyed the one-to-one attention, so it was easy to get his collaboration. The same activity

structure as in the first condition would be followed for the second condition.

The session always ended either when both conditions were completed (12 trials for each one), or if Sam had expressed a desire to terminate. Sam never intentionally requested to stop working. At the end of each session, Sam was provided general verbal praise for his collaboration.

The second baseline was conducted at the group home where the participant lived. The same procedures as stated above were used in the group home. In the group home, sessions occurred after dinner using leisure time for drawing and for snacking.

Pretraining session. One pretraining session (30 minutes approximately) was held during the transition from baseline to intervention. Following the baseline, the experimenter accompanied by the participant drew the Sigsymbols which were on both communication devices during baseline. These items were going to be taught during intervention. Part of the rational of Sigsymbols is the interactive learning and physical involvement that goes with the design and learning of the symbols. The graphic symbols were drawn from a photograph of the real object, and/or the correspondent sign for all the items. The Pretraining was terminated when all symbols had been drawn.

Intervention. During intervention, verbal feedback and physical modeling on the use of specific requests were introduced for both communication devices (picture board and

the VOCA). The treatment phase consisted of teaching specific requests by instructing and modeling the randomly alternating (for purpose of the experiment) use of a communication board and a VOCA (using the same graphic symbols for both conditions). Each intervention session would start with the same prompt as in baseline ("Sam, do you want to work with me for a while ?"). Each randomly selected condition would also start with the drawing activity. At the cue "Sam, What do you need to draw ?", Sam was expected to correctly use the specific request "I want" plus the item. If the response was incorrect, the experimenter would say "No, that is not correct", and model the correct response by physically taking Sam's index finger to point to the correct sequence of symbols. Simultaneously, the experimenter would verbalize the correct sequence ("You have to say: I want paper"). Verbal feedback and physical modeling of the specific request response were always provided along with the requested item even though the trial had been scored incorrect. Following, a new trial would be introduced by the prompt "What else do you want/need?" Whenever Sam's response was correct, positive feedback ("Sam, that's correct ; good job") and the desired object were provided immediately. If incorrect, the sequence of verbal feedback and physical modeling was immediately implemented and eventually the requested object would be provided. After completing the 12 trials for the first condition, the same routine was followed

for the second condition with the remaining communication device.

Intervention was completed once Sam had reached the criterion of 85% correct responses in two consecutive sessions for either of the two communication devices.

The procedures during intervention were identical at both experimental settings.

Preference Assessment. During the preference assessment, corrective feedback and modeling were withdrawn. The purpose of this phase was to assess the participant's preference for either one of communication devices. In all preference sessions, both communication devices were presented to the participant for each of the trials. The position of the devices on the desk was randomized in order to avoid a position effect. Initially, Sam was prompted to start the session by the experiementer's cue ("Sam, Would you like to work with me for a while?"). Then, Sam selected one device to respond to the prompt "Let's draw for a while. What do you need to draw?". Once the device was selected, the other was removed from the table until the next trial ("What else do you want/need?") in which Sam had to choose again the preferred communication device. Preference data were collected at both settings following identical procedures.

Maintenance and Generalization. Probes were collected at both settings one week, two weeks and four weeks after the preference assessment was completed. In this phase both devices were presented to the subject only for the first

trial. The remaining trials were conducted with the communication device Sam had chosen following the same procedures as the rest of the experiment, though no feedback or modeling was provided in case of incorrect response.

Two generalization probes were conducted in a third community setting (a fast food restaurant with communicative partners other than the experimenter). Sam was offered both devices and was asked to select the device he wanted. Once a preferred device was selected, it was used for all trials in the setting. Corrected responses were recorded when Sam obtained the desired items by using the 'specific request' with three novel items (i.e., hamburger, ice-cream, and french-fries). Sam had been taught to point at and use those three items in both communication devices prior to the visit to the fast-food restaurant at the vocational center and during the trip to the fast food restaurant when asked what he would like to get at the restaurant ("Sam, we are going to McDonald's. What would you like to order?"). No corrective feedback was provided for incorrect responses. The purpose of these probes was to see whether Sam would be able to use his prefered device when faced with unfamiliar partners.

RESULTS

Figure 1 shows that the subject met criteria (85% correct) for both communication devices at both settings during intervention and kept the criteria during preference assessment and maintenance phases.

Insert Figure 1 about here

For the baseline at the vocational center, the mean percentage of correct specific request "I want + item" was 0 % for all sessions (and both conditions). During intervention the participant reached gradually the criteria of 85% correct for both communication devices. The mean percentage correct for VOCA was 60% (33%-88%) 52% for the picture board (11%-88%). During preference assessment, the participant kept the criteria level using the prefered device (mean=92%, range=88%-100%). Maintenace data show an upward trend mean=79% and range 66%-88%.

At the group home, the mean percentage of correct response during baseline was 1.57% (0%-11%) for the VOCA and 0% for the picture board. During intervention, the client met the criterion with the picture board with mean percentage 74% (66%-88%). For the VOCA condition, the mean percentage was 77% (66%- 88%). The preference assessment shows that Sam chose the VOCA 100% of the times and used it with acceptable criteria for all preference assessment sessions (mean=100%). Maintenace data at the group home reveal a downward trend with mean 84.66% and range 100%-66%.

Generalization measures indicate that Sam generalized the use of his preferred communication device (VOCA) to different settings and different communication partners and

successfully requested items of his choice at the fast food restaurant (mean=73%; 70%-75%).

DISCUSSION

This study demonstrated that a person with profound mental retardation can rapidly acquire the functional use of two communication modalities within meaningful routines. Furthermore, the subject showed stronger preference for one modality (VOCA) over the other (picture board).He maintained and even generalized the use of his preferred modality to a third community setting and unfamiliar partners. Sam's use of specific requests did not reach criteria in any of the generalization probes. This is in part because he ordered through single pointing (e.g., "hamburger", "french-fries") rather than "I want" + item. However, he obtained the desired item successfully and effectively (though the trial was not scored correct). It must be mentioned that Sam's excitability interfered somewhat with the trained use of the device (specific requests). Sam was thrilled with going out and being able to stand at the cashier and order by himself. It is possible that he was so excited that he did not perform correctly the specific request combination ("I want + item"), though his order was successful. Although the generalization probes cannot be compared against pregeneralization baseline, we have a strong comparison between generalization and baseline performance.

At this point of time, this is the first experimental study that includes subject's choice making in the selection

of target communication modality although it has been suggested to be included during AAC assessment (Jones, et al., 1990). The results of this study do not suggest that the prefered modality is learned more rapidly than the non-prefered, they provide strong support for the importance of preference as performance in the prefered mode improved over that in the intervention phase.Although the satisfaction experienced from being able to communicate and control the environment may lead the AAC user to utilize any available technique, we believe that preference should be one consideration when selecting communicative modality for an AAC user. Yet if a client is to be given the choice of selecting a prefered modality, prior training should be provided with the possible devices under consideration, so that he/she has the experience that would allow him to make an informed choice.

As repeatedly recommended by AAC experts, the communication training carried out in this study took place during naturally structured activities in which the participant felt motivated to communicate his wants and needs (Glennen & Calculator, 1985). The success of the training was generalized to a community setting. It is crucial to point out that one of the most serious problems that must be addressed when planning communication programs for persons with severe mental retardation or any other developmental disability is the lack of naturally occurring communication opportunities. Intervention studies show the lack of

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responsiveness and understanding that potential communication partners (relatives, teachers and other staff members) exhibit when interacting with persons with severe disabilities who use AAC systems (Light, Collier, & Parnes, 1985a; Basil, 1992). For example, the staff members involved in this study interpreted the experimental sessions as a reward for the participant rather than as a learning experience and therefore voluntarily limited the use of either communication device for when the subject had been compliant enough.

The limitations found in this study relate among others to the generazibility of the results since this study involved only one subject. Replications of this study are strongly recommended. The durability of the intervention effect may also seem questionable (LaVigna et al.,1989). Maintenance data at the group home seem to follow a downward trend. It is important to mention that Sam went through the trauma of staff turn-over at both the vocational center and the group home during maintenance phase. Under these circumstances, disruptive behavior was clearly interfering with maintenance sessions. The use of the communication devices was simply not prompted at either setting because the staff was trying to deal with disruptive behaviors through punishing consequences (e.g., time out) rather than through communicative interaction (which was classified as a reinforcer and therefore withdrawn except when the experimenter visited the settings). Training communicative

partners and staff members in the use and understanding of the AAC system is warranted if we want AAC intervention be successful and mainteined in settings such as group homes(Rein, Parsons & Green, 1989).

One possible reason for the downward trend of the maintenace data at the group home may also be related to the fact that intervention in that setting was shorter than in the vocational site, since Sam reached criteria faster. Shorter intervention may have to do with the non-durability of the results (LaVigna, Willis & Donnellan's, 1989).

Although Sam chose his prefered modality, and thus he felt the empowerment of exerting control over his environment, his choice does not necessarily coincide with the choice that most experts would have made for a fast food restaurant. It may be that a VOCA is not the most efficient device for a setting like a fast food restaurant (Doss et al., 1991), however the participant's preference should not be understimated. It appears that learning and skill acquisition is directly related to preference and choice making.

In summary, the importance of AAC intervention for individuals with mental retardation who have little or no functional speech continues to increase as the integration of these persons into their communities increases. Manual signs, VOCAs and picture boards can be effective communication modes, yet manual signs appear not to be intelligible for untrained individuals. Even, staff members

with training in manual signs find it hard to use signs expressively to communicate with signers and even to understand their clients signs (Bryen, et al., 1989; Bryen & McGinley, 1991).

Ideally, and in order to be socially independent, AAC users should always have a secondary (back-up) system when interacting with partners unfamiliar to their primary means of communication. We are not suggesting that VOCAs or picture boards should replace manual signs. Manual signs have been found to be an effective and functional communication mode for those persons who interact in an environment where signing is understood. However, the primary aim of AAC intervention should be to provide the learner with vocabulary flexibility, functionality and system intelligibility.

Further research is needed to determine which modalities or combination of modalities are more effective and efficient to meet the communicative needs of persons with severe communication impairments, to meet environmental and contextual demands, and to adjust for the competence of the respective partners.

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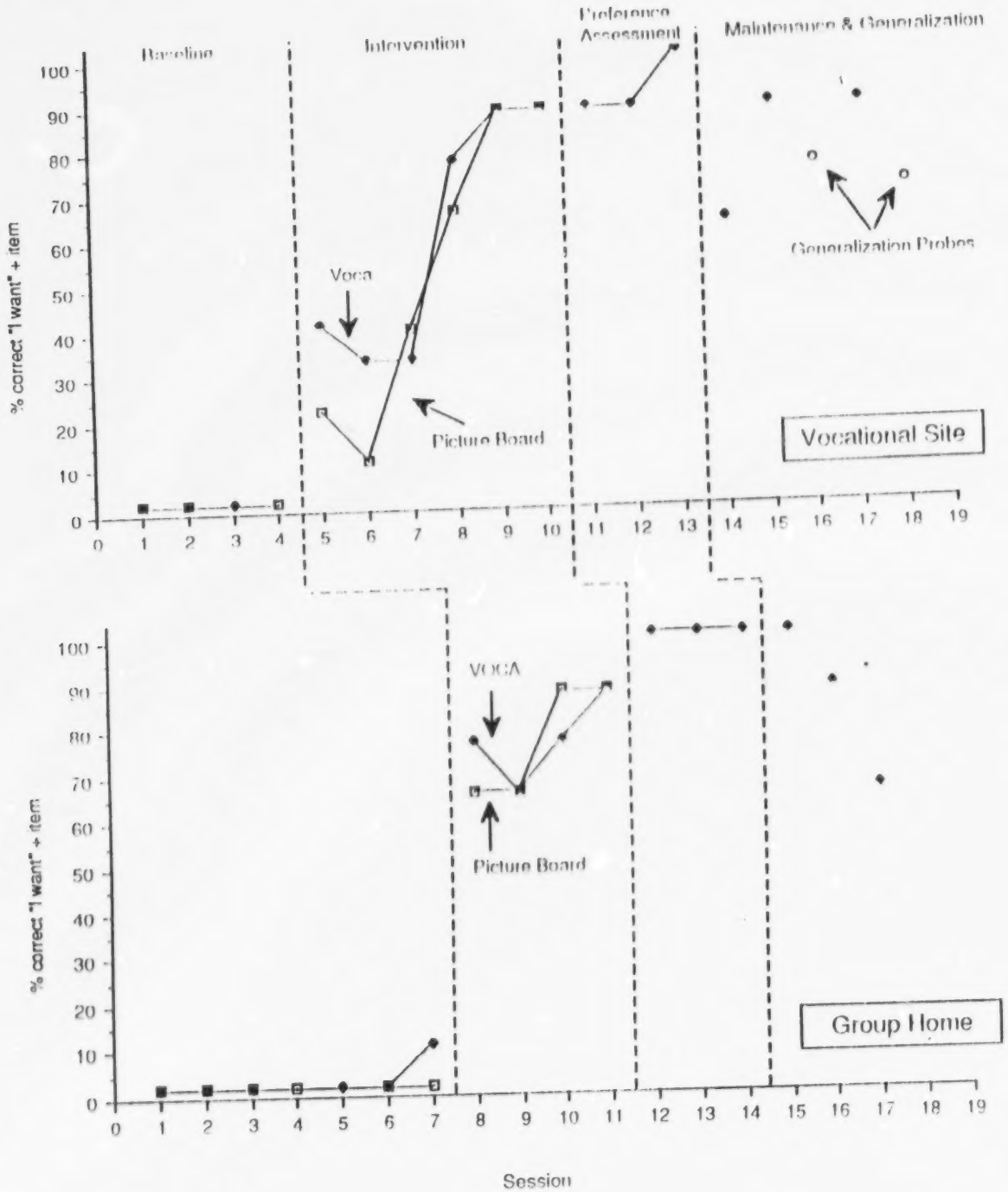
Caption for Figure 1

Figure 1. Session percentage of correct specific requests ("I want" + item) during baseline, intervention, preference assessment, maintenance and generalization probes.

Figure 1


Baseline
Intervention
Preference Assessment
Maintenance & Generalization
Voca
Picture Board
Generalization Probes
Vocational Site
VOCA
Picture Board
Group Home
% correct "I want" + item
Session

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